What is claimed is:

1. A Royer circuit comprised of:

a first transformer having a saturating core about which is wound at least two windings that include: a primary winding with first and second inputs and a secondary winding having first and second outputs;

a first wide band gap transistor coupled to said first input; and

a second wide band gap transistor coupled to said second input;

said first and second wide band gap transistors alternately delivering current to the inputs of the primary winding from a power source thereby generating a substantially square-wave output voltage across the secondary winding outputs.

2. The Royer circuit of claim 1 wherein at least one of said first and second wide band gap transistors are formed from silicon carbide.

3. The Royer circuit of claim 1 wherein at least one of said first and second wide band gap transistors are bipolar junction transistors.

4. The Royer circuit of claim 1 wherein at least one of said first and second wide band gap transistors is a Darlington pair.

5. The Royer circuit of claim 1 wherein at least one of said first and second wide band gap transistors is a field effect transistor.

6. The Royer circuit of claim 1 wherein said first and second wide band gap transistors are radiation hard.

7. The Royer circuit of claim 1 wherein said first and second wide band gap transistors are capable of operating in ambient temperatures over 300° C.

8. A Royer circuit comprised of:

a first transformer having a non-saturating core about which is wound at least three windings that include:

a first primary winding having first and second input terminals,

a first secondary winding having first and second output terminals; and

a second, secondary winding also having first and second output terminals;

a first wide band gap transistor coupled to said first input terminal of said first primary winding;

a second wide band gap transistor coupled to said second input terminal of said first primary winding;

a second transformer having a saturating core, about which is wound a primary winding with at least first and second inputs coupled to the first and second output terminals of the second, secondary winding, said second transformer having a secondary winding, the outputs of which are coupled to corresponding inputs of said first and second wide band gap transistors; and

wherein the inputs of said first and second wide band gap transistors receive signals from the second transformer whereby they alternately deliver current to the inputs of the primary winding of the first transformer from a power source thereby generating a substantially square-wave output voltage across the first secondary winding outputs of the first transformer.

9. The Royer circuit of claim 8 wherein said second transformer includes a center tap, to which a third, wide band gap transistor is coupled, said third wide band gap transistor providing start up current to first and second wide band gap devices.

10. The Royer circuit of claim 8 wherein at least one of said first and second wide band gap transistors are formed from silicon carbide semiconductor material.

11. The Royer circuit of claim 8 wherein at least one of said first and second wide band gap transistors are bipolar junction transistors.

12. The Royer circuit of claim 8 wherein at least one of said first and second wide band gap transistors is a Darlington pair.

13. The Royer circuit of claim 8 wherein at least one of said first and second wide band gap transistors is a field effect transistor.

14. The Royer circuit of claim 8 wherein said first and second wide band gap transistors are radiation hard.

15. The Royer circuit of claim 8 wherein said first and second wide band gap transistors are capable of operating in ambient temperatures over 300° C.

16. A high-temperature regulated power supply having an output terminal, said power supply comprised of:

a Royer inverter circuit having at least a first transformer having at least a primary winding with first and second inputs and a secondary winding having first and second outputs, the Royer inverter circuit including a first wide band gap transistor

coupled to said first input of said primary winding and a second wide band gap transistor coupled to said second input of said primary winding;

a pulse-width modulator (PWM) having an voltage supply input and a variable pulse width output and a control input, the voltage supply input of said PWM being coupled to at least one of said first and second outputs of said secondary winding, the variable pulse width output of the PWM being a pulse train having a duty cycle determined by a signal input to said control input of said PWM from the output terminal of said power supply and a signal from at least one of the first and second outputs of the secondary winding;

a third wide band gap driver transistor having an input and an output, the input of said wide band gap driver transistor being coupled to the variable pulse width output of said PWM;

an output transformer having a primary winding and a secondary winding, the primary winding being coupled to the output of said wide band gap driver transistor, the secondary winding being coupled to the input of a an output rectifier, an output of said output rectifier being coupled to a filter and to the control input of said PWM, said third wide band gap driver transistor controlling the flow of current through control winding of MAG AMP transformers to produce an output voltage that is regulated by signals input to the control input of said PWM.

17. The high-temperature power supply of claim 16 wherein said pulse-width modulator is comprised of at least one magnetic amplifier coupled to at least one of the outputs of the secondary winding of said Royer circuit.

18. The high-temperature power supply of claim 16 wherein said pulse-width modulator is comprised of a first magnetic amplifier coupled to the first output of the secondary winding of said Royer circuit and a second magnetic amplifier coupled to the second output of the secondary winding of the Royer circuit.

19. The high-temperature power supply of claim 16 wherein said rectifier is a full-wave rectifier comprised of wide band gap semiconductors.

20. The high-temperature power supply of claim 16 wherein said rectifier is a bridge rectifier comprised of wide band gap semiconductors.

21. The high-temperature power supply of claim 16 wherein said first and second magnetic amplifiers are first and second transformers, the primary windings of which are

connecter in series between a reference potential for said high-temperature power supply and an adjustable current sink.

22. The high-temperature power supply of claim 21 wherein said adjustable current sink is a voltage-to-current converter having a control input coupled to the output terminal of the power supply.

23. The high-temperature power supply of claim 16 wherein at least one of said first, second and third wide band gap transistors are formed from silicon carbide semiconductor material.

24. The high-temperature power supply of claim 16 wherein at least one of said first, second and third wide band gap transistors are bipolar junction transistors.

25. The high-temperature power supply of claim 16 wherein at least one of said first, second and third wide band gap transistors is a Darlington pair.

26. The high-temperature power supply of claim 16 wherein at least one of said first, second and third wide band gap transistors is a MOSFET.

27. The high-temperature power supply of claim 16 wherein (5 total?) said first and second wide band gap transistors are radiation hardened.

28. The high-temperature power supply of claim 9 wherein said first, second and third (forth, fifth) wide band gap transistors are capable of operating in ambient temperatures over 300° C.

29. A high-temperature power supply comprised of:

a first signal generator having an output whereat a substantially square wave signals is presented;

a first magnetic amplifier (MAG AMP) having a first input terminal coupled to the output of said first signal generator, said first MAG AMP also having a control current input terminal coupled to a current sink, a control current output terminal and further having an output voltage terminal at which is generated a voltage pulse, the time duration of which is determined by a signal at said first input terminal and current flowing through said control current input terminal and said control current output terminal;

a second magnetic amplifier (MAG AMP) having a first input terminal coupled to the output of said first signal generator, said MAG AMP also having a control current input terminal coupled to the control current output terminal of said first MAG AMP and further having a control current output terminal, and further having an output voltage

terminal at which is generated a voltage pulse, the time duration of which is determined by a signal at said input terminal and a current flowing through said control current input and control current output;

an error voltage detector having a reference voltage input and a control voltage input and further having an output coupled to the control current output of said second magnetic amplifier and through which current flows according to the voltage difference between said reference input and said control input;

at least a first wide band gap driver transistor having an input coupled to the output voltage terminal of said first magnetic amplifier, and having an output coupled to a first input terminal of the primary winding of an output transformer having a primary winding and a secondary winding;

a second wide band gap driver transistor having an input coupled to the output voltage terminal of said second magnetic amplifier, and having an output coupled to a second input terminal of the primary of the output transformer,

a rectifier, having an input coupled to an output of the secondary winding of said output transformer, said rectifier further having an output;

a choke having an input coupled to the output of said rectifier, said choke also having an output at which a regulated D.C. voltage is available and which is coupled to the control input of said error voltage detector.

30. The high-temperature power supply of claim 29 wherein said rectifier is a full-wave rectifier comprised of wide band gap semiconductors.

31. The high-temperature power supply of claim 29 wherein said first and second magnetic amplifiers are first and second transformers, the primary windings of which are connecter in series to each other, and the series connected windings are across a reference potential for said high-temperature power supply and an adjustable current sink.

32. The high-temperature power supply of claim 29 wherein said error voltage detector is a voltage-to-current converter having a control input coupled to the output of the output rectifier and having a reference potential input.